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Crew Endurance Management Newsletter

an information resource about the Crew Endurance Management System (CEMS) for its practitioners and those interested in learning more about it

Crew Endurance Resources

Welcome to the Crew Endurance Newsletter. We've made some format changes, but continue to bring the same quality of sleep and endurance-related information to support your personal knowledge of Crew Endurance Management and implementation.

READER INTERFACE NOTE:
When reading on the Internet, the symbol to the right indicates a hyperlink for the subject matter indicated in blue, underlined text. Readers with printed copies can visit our website for more information:

http://www.uscg.mil/hq/g-m/cems/index.htm

Much of the information in this issue was originally printed in the National Sleep Foundation's weekly *Alert* – if you'd like to receive this information regularly, sign up with them here – it's free!

Please be sure to pass this information along to others so that they can register with us.

This Issue:

Risk Factor Spotlight: High Workload and High Stress

by LT Samson Stevens, CSCS

In our last issue, we discussed consequences of—and ways to avoid—a *Poor Diet*. In this issue, we will explore two Crew Endurance Risk Factors that often overlap—*High Workload* and *Stress*. For a review of all 15 Crew Endurance Risk Factors, please see the following link to the Decision Support Worksheet:

Crew Endurance Risk Factors

High Workload

> *"Having to work hard is just part of being a mariner, isn't it? That's what the industry is all about. Now you're going to tell me that high workload is a risk factor to crew endurance!?"*

This is not an uncommon sentiment among the industry, so let's examine the idea further. Jobs requiring significant physical exertion or mental effort take their toll on the human body much more quickly than those that don't. Sleep is designed to recuperate both our bodies and our minds. When our bodies are taxed with significant mental and physical efforts, sleep becomes that much more important to replenish lost energy. Additional concerns regarding the amount of workload an individual is required to do include dehydration (if working in hot temperatures), physical injury (if the musculoskeletal system is overworked), and mental stress (in demanding situations requiring significant thinking and decision-making).

Relating to the systemic nature of CEMS, let's take this from another perspective. Have you ever experienced a workload that exceeds your capabilities, even to the point that you can't sleep because you're trying to figure out how you're going to get it all done? This is just another example of how workload can contribute to decreased endurance. When these two elements interact, there is a compounding effect on your ability to endure. If *you* are not doing *your* part to repay energy debts resulting from high workloads, or the *environment* in which you work is not sensitive to your workload *capabilities*, you can expect decreases in performance and safety. It's for these very reasons that the Crew Endurance Management System factors high workload as a risk factor.

Physical vs. Mental Workload

> *"Physical efforts are more taxing than mental efforts, right?"*

Although you might initially think that manual tasks (heavy lifting, line hauling, cleaning, maintenance, etc.) are more demanding than mental tasks, think about the last time you really concentrated on something for an extended period of time (perhaps your last Coaches Exam?). Or how about standing a navigational watch in a congested waterway where you must pay attention to every vessel, radio call, bridge crossing, and waterway current? (con't)

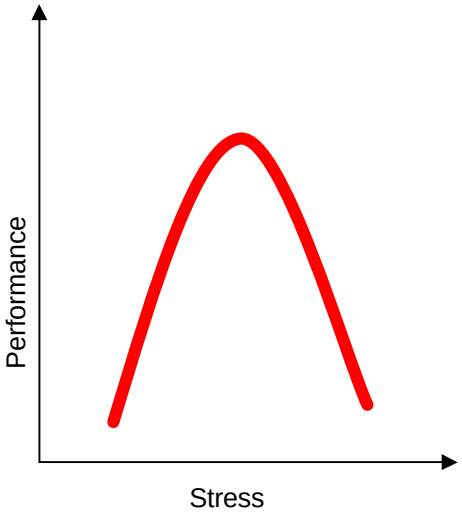
You were probably just as exhausted, if not more, than a hard day of physical labor. It's for this reason that either type of effort is considered a Crew Endurance Risk Factor, and equal in its own right with regard to its effects on long- and short-term endurance.

High Stress

Stress is one of those ambiguous catch-all terms that seems to be blamed for everything from weight-gain and heart disease to depression and poor mood. What exactly is it, and what are its consequences? Major contributors to workplace stress include:

- *How work and tasks are designed:* heavy workload, high mental effort, infrequent rest breaks, long work hours and shift work, hectic and routine tasks that have little meaning, not utilizing workers' skills.
- *Management style:* lack of participation by workers in decision-making, poor communication in the organization, lack of company policies that take employees' family and personal obligations into consideration.
- *Vague or changing job descriptions due to company reorganizations*
- *Concerns about employment or career:* job insecurity, lack of advancement opportunity, rapid changes due to unanticipated downsizing, mergers or hostile acquisitions.
- *Environmental conditions:* noise, temperature, and/or vibration.
- *Discrimination*
- *Violence and physical and verbal abuse*

Although this list is far from complete, many of you have probably already realized that not all stress is bad. In fact, some level of stress is needed to stimulate a person's ability to perform. Have you ever encountered a task that requires such low levels of concentration/ stress, that you found yourself quickly bored and ready to fall asleep? Conversely, too much stress can lead to the inability to concentrate, frustration or resignation, losses in appetite, and sleeplessness, among a variety of other symptoms.



This relationship can be viewed as an inverted U – low levels of stress result in low performance, moderate levels of stress result in high performance, and high levels of stress result in low performance.

With stress, the key is for individuals to find a balance that they are comfortable with, yet does not overwhelm them. As in "high workload" above, there are two mechanisms at work here. Firstly, the body must use more energy to cope with the increased demands of stressful situations. This energy needs to be replenished via adequate, quality sleep. Secondly, high stress in and of itself results in the inability to sleep. When acting together, sleep, recovery, perform ance, concentration and *endurance* all take a serious hit!

As an illustration of stress in the maritime industry, the United Kingdom Marine Accident Investigation Branch (MAIB) issued its report of the investigation into the collisions between the chemical tanker RENO and the fishing vessel OCEAN ROSE on 6 March 2004 off Whitby in the North Sea. The report concludes that the first collision occurred because the chemical tanker's watch officer was absent from the bridge. The second collision was primarily a result of the master of the chemical tanker being **under great stress**. Hmmm….maybe stress is just that important after all! Read more about the details here:

Report No. 13/2004

High Workload + High Stress = **Burnout**

As a final note, it is worth mentioning the dynamic relationship among stress, workload, and burnout. Although burnout is often attributed to a person's intrinsic motivation to perform or their personal skills and abilities, it is usually a direct result of excessive workloads and high-stress environments. These conditions result in workers becoming detached, unmotivated, unproductive, uncaring, etc. Thus the very characteristics of the work system result in reduced endurance and increased risk of safety accidents. As you've continued to educate yourself on the components of Crew Endurance Management, you can see how the system is designed to address all these issues systematically, so that crewmembers can better endure *and* enjoy their jobs, and become safer individuals.

CEMS In National News

CEMS Wins NSF Award

In March 2003, the National Sleep Foundation (NSF) awarded the 2005 Healthy Sleep Community Award to the USCG for its Crew Endurance Management Program. The award recognizes outstanding efforts by a community organization or jurisdiction to conduct a sleep activity or program with effective, long lasting results on a significant proportion of a population. According to the NSF's press release:

"The CEM program has fundamentally revolutionized operations in the maritime industry, by integrating knowledge of human physiology and sleep requirements into development of work schedules and work practices. Working with Coast Guard Operational units and partners in the commercial maritime industry, the Coast Guard initiated efforts to better understand the incidence and severity of fatigue in maritime operations. These efforts included studies aboard vessels at sea to document the effects of marine operations on the health, safety, and performance of crewmembers, workshops with multiple shipboard crews to explore ways to mitigate sleep and endurance risks, and partnerships within the commercial maritime industry to help integrate CEM principles into operational doctrine and guidance.

The response to the CEM program has been very positive. The old adage 'iron men on wooden ships' is on its way out, being replaced by promotion of good sleep behavior and sleep environments for maritime workers. After CEM training, participants often report that integrating healthy sleep into their operations is not difficult, and would have been done long ago if they were aware of the information and research."

This is the seventh year that NSF has honored Healthy Sleep Communities. The awards were presented in Washington, DC during National Sleep Awareness Week®, NSF's annual week-long campaign to raise awareness about the importance of sleep. This year, it was celebrated from March 28-April 3, and the awards were presented March 29 as part of a news conference to discuss the results of NSF's 2005 *Sleep in America* poll.

From l-r: Richard L. Gelula (NSF CEO), Dr. Carlos Comperatore (USCG R&DC), CDR Bryan Emond (USCG HQ), RADM Thomas Gilmour (USCG HQ, G-M), Dr. Meir Kryger (NSF Board of Directors), Ms. Jennifer Carpenter (AWO).

CEMS and Accident Prevention

Extended Shifts Put Medical Interns at High Risk of Vehicle Crashes

In our last issue, we reported on the correlation between long work hours and human error among hospital nurses. In this issue, we report on a study that continues this frame of thought and highlights the dangers of fatigue and drowsy driving.

Dr. Charles Czeisler and researchers in the Harvard Medical School and Brigham and Women's Hospital Divisions of Sleep Medicine have published a study in *The New England Journal of Medicine* connecting long shifts with risk of motor vehicle crashes among medical interns.

Of the 2554 volunteer responses, **320 participants (12.5%) reported motor vehicle crashes.** The research shows that the odds of interns having a motor vehicle crash after an extended work shift **was more than double** the odds after a non-extended shift.

How does this relate to you? As a commercial mariner, you more than likely encounter driving situations after your "hitch," and, like medical interns, put in long hours under stressful conditions for weeks at a time. Fatigue on the roadways is a silent killer – if you are tired and having trouble keeping the eyelids open, PULL OVER and take a short nap!

For more information on this study and drowsy driving:

- Read the motor vehicle crash study from *The New England Journal of Medicine*
- Check the abstract from the medical error study in *The New England Journal of Medicine*
- Get Sleep Strategies for Shift Workers
- Visit www.drowsydriving.org

CEMS and Accident Prevention

Norwegian Center for Transport Research Releases Drowsy Driving Report

As an illustration of the global issue of fatigue and human error, the Institute of Transport Economics (Transportøkonomisk institutt, TØI) of the Norwegian Centre for Transport Research released a report summary of a workshop held in Oslo, Norway focusing on driver fatigue and sleepiness. Topics covered include:

- incidence of driver sleep and the role of sleep and fatigue in crashes
- the biological basis of sleep, and medical and clinical aspects
- simulator studies of fatigue indicators
- eye and eyelid movements as fatigue indicators
- in-car warning systems to prevent falling asleep while driving
- fatigue management among occupational drivers

The full report is available here:

http://www.toi.no/attach/a935081r26271/739_2004.pdf

Driving Tired Worse Than Driving Drunk

Originally from the February 8, 2005 *NSF Alert*:

Four people were killed and 19 others were injured when a charter bus carrying a Canadian women's hockey team slammed into a tractor trailer that was parked on the shoulder of Interstate 390 near Rochester, NY. The 24-year-old bus driver, Ryan Comfort of Windsor, Ont., told police that he swerved to avoid something and denies falling asleep at the wheel of the bus. However, **no skid marks were found at the crash scene** and so far police have been **unable to find evidence of mechanical failure**.

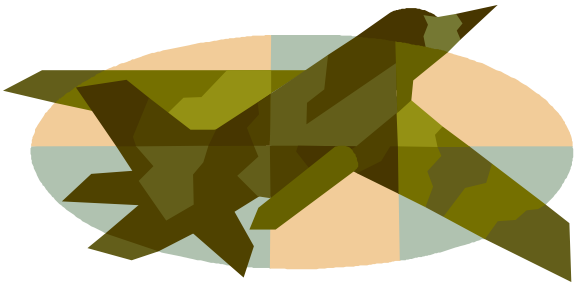
Comfort is being charged with multiple misdemeanor counts of falsifying log book entries, including **one for not reporting work in the hours before the crash**.

More resources:

- Read the full article
- Visit our Drowsy Driving web site
- Help NSF combat the tragedy of drowsy driving

British Airways Survey Finds 25% Fall Asleep at Meetings Due to Sleep Deprivation

Boring meetings may not always be the reason why some people drift off to sleep. British Airways and Research International surveyed 1,000 professionals during National Sleep Awareness Week®. They found that 25% admitted to falling asleep in a meeting due to sleep deprivation and 70% felt they were less productive after traveling. Nearly one in five had a presentation go badly or lost business as a result of poor sleep due to air travel. Read more about jet lag and the British Airways survey and get the basics on jet lag and sleep and traveling.



Loyola University Health System of Chicago has launched a drowsy driving prevention section on their transportation web site. Check it out here:

http://www.luhs.org/depts/injprev/Transprt/tran1-02.htm

CEMS and Your Health

Circadian Disruption a Risk Factor for Breast Cancer?

(Originally from the February 8, 2005 *NSF Alert*)

In previous issues we've highlighted correlations between sleeping and your health. In this issue we report on a group of researchers (led by Dr. Richard Stevens and a team from the Department of Epidemiology and Public Health at Yale University School of Medicine) who set out to discover if there is a connection between breast cancer and a gene that is a central component of the biological clock. Interestingly, the findings suggest that the genes that control circadian rhythms might be a potential biomarker for breast cancer.

Dr. Stevens explains, "We looked at the features of industrialization – electricity, altered light and artificial light at night. The idea is that the use of electric lights at night can play a role in the risk increase of breast cancer." While this genetic research and a recent study finding increased breast cancer in nurses working the night shift suggest new research directions, more investigation needs to be done.

More Resources:

- Read the abstract from the study
- Get the whole story on Women and Sleep
- Read about the nurses study

When is Snoring *More* Than Just Snoring?

(Originally from the March 1, 2005 *NSF Alert*)

Is your snoring a symptom of something keeping you awake? Despite the fact that snoring is one of the main symptoms of obstructive sleep apnea (OSA), a study in *Archives of Otolaryngology -- Head and Neck Surgery* concludes that **it takes more than a medical history and evaluation of physical features** (for example, a short neck or narrow airways) to **distinguish between OSA and snoring**. In other words, only an overnight sleep study can provide a definitive diagnosis.

As further comment on the above story, it should be noted that OSA is a serious factor in getting enough quality sleep. Most people today recognize that sleep apnea means that you stop breathing when you are sleeping. Besides resulting in high blood pressure and lack of oxygen to the brain, your body continuously "shakes" you awake to start you breathing again. While you may not remember being awakened, your body and brain know that they have had their sleep cycles interrupted. As you know from previous newsletters on sleep fragmentation and continuous sleep requirements, these apnea-related interruptions contribute to significant feelings of tiredness after what you believe to have been 8 hours of sleep. In reality, **your "8 hours" of sleep was probably much more like 4 hours!** If you often feel tired and not rested after 8 hours in bed, get to a sleep clinic and have an overnight test. You may find that you, too, have sleep apnea.

More Resources:

- Read the abstract
- Prepare for a sleep lab visit
- Learn more about sleep apnea

Sleep Apnea Treatment May Lessen Severity of Diabetes

(Originally from the March 9, 2005 *NSF Alert*)

Continuing the discussion of sleep apnea, recent research has indicated that treating apnea may **help treat Type II diabetes**. A study in the February issue of *Archives of Internal Medicine* evaluated 25 individuals with controlled Type II diabetes who had been referred to a clinic because of sleep apnea. The patients were studied before and after continuous positive airway pressure (CPAP) treatment for sleep disordered breathing (SDB). They concluded that sleep apnea treatment helped reduce blood glucose levels, especially in patients who used a CPAP more than four hours a night.

More Resources:

- Read the abstract
- Learn more about sleep apnea
- Find out about sleep studies

CEMS and Your Health

Initial Findings of Mutated Clock Gene and "Metabolic Syndrome"

(Originally from the April 27, 2005 *NSF Alert*)

We continue to bring you news of the correlation between sleep and health—in this case, the multifaceted "Metabolic Syndrome." This syndrome is identified by a combination of high blood pressure, high insulin levels, excess body weight, and abnormal cholesterol levels -- characteristics of many of our most serious health problems, including obesity, diabetes, heart disease and stroke.

When a body clock gene is mutated in mice, it affects not only sleep, but also appetite and metabolism.

A study sponsored by the National Institutes of Health, conducted at Northwestern University and published this month in Science, shows that when a bodyclock gene is mutated in mice, it affects not only sleep, but also appetite and metabolism. This results in weight gain, producing effects similar to the metabolic syndrome, even when diet is controlled.

Scientists feel that the mechanism underlying these changes in the mice doesn't require a genetic change, but could also be triggered in humans by irregular sleep patterns, such as sleep disorders and sleep deprivation.

For more details regarding this study and metabolic syndrome, see below:

- Read the abstract (note: you must register for free access)
- Learn more in the press releases from Northwestern University and National Institutes of Health
- Read recent research on the *Clock* gene from NSF Alert
- Learn more about metabolic syndrome

CEMS in the Maritime

Jet Lag Cited in Tauranga Chief Grounding, Sydney Harbor

(Originally from *Lloyd's List* daily news bulletin)

SWIRE containership Tauranga Chief ran aground in Sydney Harbour in early 2003 because the **helmsman wrongly executed a wheel order**, **possibly because he was jet-lagged**, the Australian Transport Safety Bureau has concluded in its report of the incident.

The ATSB said that the entire crew had joined the ship from St. Petersburg in Russia just two days before the incident on January 17, 2003. The helmsman had made an even longer journey than his shipmates, via Frankfurt and Singapore, and had joined the ship in Port Kembla only 39 hours before the incident. **The report said that the slow reaction time of the master and the officer of the watch could also have been caused by jet lag.**

The report also noted that the pilot's failure to order "midships" before ordering counter-rudder during the turn may also have been a contributing factor. The ship grounded on a sand patch, and was refloated by two harbour tugs on the rising tide after half an hour, with only paintwork damage.

Those of you familiar with Crew Endurance know that "jet lag" is another term for your body clock being out of synch with your work time. In other words, **when you need to be awake, your body wants to be asleep**. This will affect your body in many ways just as going without sleep will. To resynchronize your body clock, **light management** and **sleep hygiene** must be used to provide appropriate signals to your body.

For more information on this specific incident see the Australian Transportation Safety Board report: http://www.atsb.gov.au/marine/pdf/190_tauranga_chief.pdf

CEMS in Other Transportation

Commercial Truck Drivers' Hours-of-Service Rules Under Reconsideration

(Originally from DOT News Services, January 19, 2005)

Trucking has similarities to the maritime industry—for example, the long hours worked by drivers who are also responsible for the safety of themselves and others. The U.S. Department of Transportation's Federal Motor Carrier Safety Administration (FMCSA) is re-examining the 2003 Hours of Service (HOS) rule that regulates the amount of time commercial truck drivers can operate their vehicles.

"We are moving aggressively to make sure we have the best regulations in place to ensure truck driver health, save lives and keep the American economy moving safely on the nation's highways," FMCSA Administrator Annette M. Sandberg said. "Public feedback is critical to this effort. We need to hear from our stakeholders about their experiences regarding the 2003 HOS rule."

FMCSA is conducting a comprehensive scientific review of HOS and the physical effects on drivers operating commercial vehicles. Moreover, the Agency has dedicated a team of staff professionals to review the current HOS regulations and determine whether changes should be made to better protect truck drivers and other highway users. In addition to the issue of drivers' health, the team is looking at provisions adopted in the 2003 HOS rule which increased the daily driving limit from 10 to 11 hours, continued drivers' use of sleeper berths, and allowed a 34-hour restart period.

The current regulations will expire at the end of September 2005. The FMCSA would like to have new regulations in effect by then. The review of the available scientific and anecdotal data on how the drivers are affected by the long hours of concentration and wakefulness combined with minimal physical activity can help show the importance of looking after ourselves.

More resources:

- Get the press release from FMCSA
- Check out NSF's statement on the 2003 HOS rules

Many Transportation Operators May Have Untreated Sleep Disorders

(Originally from NTSB Press Release, March 29, 2005)

The U.S. Department of Health and Human Services estimates that sleep disorders such as insomnia, sleep apnea, and restless legs syndrome affect 50 to 70 million Americans. The National Transportation Safety Board (NTSB) has recommended **education** for vehicle operators and their physicians about sleep disorders and how they may contribute to fatigue-related performance decrements, **improved medical exams** for commercial operators that include questions on sleep problems, and **restrictions on the use of medicines** that may cause impairment during vehicle operation.

NTSB acting Chairman Rosenker stated that the Board has linked fatigue resulting from sleep disorders to numerous accidents. He noted, **"In many cases operators are not aware that they suffer from a sleep disorder until after they have been involved in a crash."**

The Board hopes to decrease the number of accidents attributable to fatigue by raising awareness about the importance of sleep and the need for operators to be screened and, if needed, treated for sleep disorders.

CEMS Training Update and Upcoming Sessions

Coaches Training

Crew Endurance Coaches Training continues to expand via our certified Crew Endurance Expert network. There are currently 500 trained coaches in the commercial maritime industry.

July 26-27, 2005:
Houston, TX
(Foret Enterprises)
Contact: Tava Foret
tavaf@foretinc.com
713.301.9575

July 20-21, 2005:
New Orleans, LA
(Maritime Compliance International)
Contact: Kevin Gilheany
training@marcomint.com
504.319.3229

August 22-23, 2005:
New Orleans, LA
(Maritime Compliance International)
Contact: Kevin Gilheany
training@marcomint.com
504.319.3229

September 13-14, 2005:
Location TBD
(Foret Enterprises)
Contact: Tava Foret
tavaf@foretinc.com
713.301.9575

September 14-15, 2005:
New Orleans, LA
(Maritime Compliance International)
Contact: Kevin Gilheany
training@marcomint.com
504.319.3229

September 15-16 2005:
New York, NY
(Seamen's Church Institute)
Contact: Eric Larsson
ericl@seamenschurch.org
270.575.1005

October 20-21, 2005:
Houston, TX
(Seamen's Church Institute)
Contact: Bill Douglas
wdouglas@seamenschurch.org
713.674.1236

November 10-11, 2005:
Buzzards Bay, MA
(Massachusetts Maritime Academy)
Contact: Peg Brandon
pbrandon@maritime.edu
508.830.5091

November 15-16, 2005:
Location TBD
(Foret Enterprises)
Contact: Tava Foret
tavaf@foretinc.com
713.301.9575

Experts Training

Our last Crew Endurance Experts Training was held June 27-29, 2005,in Baltimore, MD at the Maritime Institute of technology and Graduate Studies (MITAGS). Thirteen attendees trained represented 11 different companies.

Our next Experts Training is scheduled for
Spring 2006
Dates and location TBD

Please contact **LT Vivianne Louie** (202.267.0173) if interested and she will notify you when the details have been finalized.

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Editor-in-Chief: CDR Bryan Emond, PE
Content Specialist: LT Samson C. Stevens
Editing Team: Kriste Stromberg
Diana McLaughlin

Website:
http://www.uscg.mil/hq/g-m/cems/index.htm

Membership Info:
http://www.uscg.mil/hq/g-m/cems/register.htm

E-mail:
fldr-GMSE@comdt.uscg.mil

Crew Endurance Resources Online

The **Coast Guard CEMS Website** continues to be updated with additional CEM information and resources. Thoughts and suggestions are always welcome regarding content and information. Please forward them to: **fldr-GMSE@comdt.uscg.mil** or call us at 202-267-2997.

Fatigue Management in Transportation Operations International Conference

Seattle, WA, September 11-15, 2005

This important, timely event will feature internationally-renowned speakers and panelists who will offer industry, research, and regulatory perspectives on current and future research and technologies related to fatigue in transportation operations. The conference is expected to attract representatives from all transportation sectors, industry, university research centers and government agencies from around the world.

The USCG and ACBL will be attending and presenting several papers/presentations on various elements of Crew Endurance Management:

- Applying Systems Analysis to the Management of Shipboard Stressors—Dr. Carlos Comperatore
- An Interactive Tool to Identify and Manage Endurance Risk in Work Environments—Dr. Tony Carvalhais
- Crew Endurance Management: A Non-Regulatory Approach and the Question of Voluntary Compliance—CDR Bryan Emond/LCDR Samson Stevens
- Implementing Crew Endurance Management in Tow and Barge Operations—Mark Dougherty, ACBL

Please visit the conference's website below to learn more and to find out about co-sponsor opportunities should you wish to highlight your efforts in the maritime industry:

http://www.engr.washington.edu/epp/fmto/home.html 

CEMS for Anyone!

When you work in an office that works so hard to promote CEMS, it can be difficult to ignore all the good advice you come across. Such was the case for contractor Diana Combs, who joined the Human Element and Ship Design Division in February as a technical writer. The following is a personal account of her experience with CEMS:

"Before I started working with the Coast Guard, I knew that exercise, water, and a good diet were good for you, and I knew that excessive caffeine, alcohol, and lack of sleep were bad for you. But, like most people, I didn't apply the knowledge, especially in the fall and winter. Then I started researching the information, and felt compelled to apply what I learned.

In the first month, I cut back on caffeine, consuming none in the last four hours before bedtime. I started drinking more water, eating more fresh fruits and vegetables, making sure I got at least seven hours of sleep per night, and exercising more. I started paying attention to my 'sleep debt' and how much of it I 'paid back' on weekends. The results were eye-opening.

I noticed that once I started drinking less caffeine, and only earlier in the day, I fell asleep much faster. This led to seven or eight hours of good sleep per night. I also noticed that on afternoons when I felt sluggish, if I drank 34 ounces of water in that two- or three-hour period, I felt much more alert. When I came down with a cold and drank water, I recovered faster than ever before.

On the contrary, in weeks when I didn't quite receive seven to eight hours of sleep per night, I tended to sleep longer on weekends. A couple of weekend nights, I had alcohol too late at night and paid the price the next day. For example, when I had a glass of beer with dinner one Saturday evening, I felt tired the next day, even though I slept at least eight hours.

All of these scenarios are examples of how my habits affected my endurance and alertness. Furthermore, these situations surprised me by their poignancy. The results were not subtle. They were poignant enough to keep me on the CEMS path to endurance."